

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

REC'D 24 MAY 2006

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Applicant's or agent's file reference O.Z. 6310-WO	FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/EP2004/053578	International filing date (day/month/year) 17.12.2004	Priority date (day/month/year) 13.02.2004	
International Patent Classification (IPC) or national classification and IPC INV. C08L23/12 C08L23/06 H01B3/44			
Applicant Degussa AG et al.			
<ol style="list-style-type: none"> 1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36. 2. This REPORT consists of a total of 6 sheets, including this cover sheet. 3. This report is also accompanied by ANNEXES, comprising: <ol style="list-style-type: none"> a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 5 sheets, as follows: <div style="margin-left: 20px;"> <input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. </div> b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions). 			
<ol style="list-style-type: none"> 4. This report contains indications relating to the following items: <div style="margin-left: 20px;"> <input checked="" type="checkbox"/> Box No. I Basis of the report <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input type="checkbox"/> Box No. VIII Certain observations on the international application </div> 			
Date of submission of the demand 24.06.2005		Date of completion of this report 22.05.2006	
Name and mailing address of the international preliminary examining authority: <div style="display: flex; align-items: center;"> <div> European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016 </div> </div>		Authorized officer Denis, C Telephone No. +31 70 340-3599	



**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/053578

Box No. I Basis of the report

1. With regard to the **language**, this report is based on

- ☒ the international application in the language in which it was filed
- ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
 - ☐ international search (under Rules 12.3(a) and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4(a))
 - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a))

2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

Description, Pages

1-11 as originally filed

Claims, Numbers

1-13 received on 24.11.2005 with letter of 24.11.2005

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing *(specify):*
- ☐ any table(s) related to sequence listing *(specify):*

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing *(specify):*
- ☐ any table(s) related to sequence listing *(specify):*

* *If item 4 applies, some or all of these sheets may be marked "superseded."*

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/EP2004/053578

Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	12
	No: Claims	1-11,13
Inventive step (IS)	Yes: Claims	
	No: Claims	1-13
Industrial applicability (IA)	Yes: Claims	1-13
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V.

Reference is made to the following documents:

D1 : EP 0 774 488 A (ALCATEL) 21 May 1997

D2 : US 6 288 144 B1 (ROBERTS DARILYN ET AL) 11 September 2001

1. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 to 11 and 13 is not new in the sense of Article 33(2) PCT.

Document D2 discloses (the references in parentheses applying to this document) a composition comprising 100 parts of polypropylene or polyethylene, 1 to 100 parts by weight (based on 100 parts of polyolefin base) of a polar mineral filler (glass, mineral filler such as magnesium hydroxide) and 0.05 to 2.0 parts by weight (based on 100 parts of filler) of a polypropylene grafted with maleic anhydride (column 4 lines 26 to 67 and column 8 lines 22 to 36). Polar fillers such as glass or magnesium hydroxide are preferably used in the composition in combination with a polyorganosiloxane compound containing amine groups which correspond to the aminosilane of general formula I of the present application (column 9 line 8 to column 10 line 52). In D2, specific aminosilane compounds that are mentioned in the present application (page 7, lines 10 to 15) are also clearly listed as suitable compounds for the compositions of D2 (column 8, lines 50 to 54). Although these compounds are not listed in D2 as "preferred" compounds for the polyolefin composition of D2, they appear clearly (and not under the form of a general formula) in D2 and belong therefore as such to the teaching of D2. Additionally, glass reinforcing materials are preferably treated with an aminopropyltriethoxysilane compound (column 8 lines 37 to 55). The polyolefin composition may also contain additional additives (column 11 lines 10 to 24). All the ingredients of the composition are mixed into an extruder, the shape of the screw used having no particular limitation (column 11 lines 3 to 9). However, D2 differs from claims 12 of the present application in that the polyolefin compositions of D2 are not used for producing flame retardant compounds for cables. The subject-matter of claims 1 to 11 and 13 is therefore not novel in view of D2.

2. The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 to 14 cannot be considered as involving an inventive step Article 33(2) PCT.

Document D2 is considered as the closest prior art over claim 12 of the present application.

Claim 8 of the present application differs from D2 in that the polyolefin compound is used for producing flame-retardant compounds for cables.

The objective problem of the present application may therefore be considered as to provide an alternative use for polyolefin compositions comprising a high amount of filler and at least one amino-functional silane or siloxane compound selected from formula (I) to (V) as listed in claim 1 of the present application.

Document D1 discloses a composition for cable insulation comprising (A) 100 parts of polyethylene, polypropylene or ethylene/propylene copolymer, (B) 1 to 20 pts of polyethylene or polypropylene grafted with maleic anhydride, 30 to 160 parts (for 100 parts of polymers (A) and (B)) of a filler such as calcium carbonate and 2 to 20 parts of a silicone compound (page 3, lines 4 to 14 and page 3, line 50 to page 4, line 34). The silicone may be functionalised with an amino group. The process involved for preparing the polyolefin compounds of D1 is described on page 10 lines 1 to 6: all the ingredients of the polyolefin composition may be mixed into an extruder to form a cable. In a preferred embodiment, the filler and the silicone compound are first mixed together before the incorporation into the polyolefin. Although document D1 does not specify the structure of the aminosilicone suitable for the polyolefin compositions, it appears clearly in D1, that aminosiloxane compounds in general may be used for the production of flame-retardant compounds for cables.

Starting from D2 and seeking to provide an alternative use for polyolefin compositions comprising a high amount of filler and at least one amino-functional silane or siloxane compound selected from formula (I) to (V), the skilled man would use the teaching of D1 without exercise of any inventive skills to solve the problem posed and apply the polyolefin composition of D2 to prepare flame-retardant compounds for cables.

The subject-matter of claim 12 of the present application is therefore not inventive.

Since claims 1 to 11 and 13 are not novel (see above), the subject-matter of claims 1 to 13

**INTERNATIONAL PRELIMINARY
REPORT ON PATENTABILITY
(SEPARATE SHEET)**

International application No.

PCT/EP2004/053578

of the present application cannot be considered as involving an inventive step.

O.Z. 6310-WO

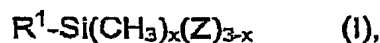
12

What is claimed is:

1. A highly filled polyolefin compound, the preparation of which uses maleic-anhydride-modified polyolefin and at least one amino-functional silicon compound, wherein

at least one amino-functional silicon compound is present from the following series:

a) aminosilane of the general formula I



where the groups Z are identical or different and Z is an alkoxy group having from 1 to 4 carbon atoms, x is 0 or 1, and R^1 is an amino group of the formula $H_2N-[(CH_2)_2NH]_y-(CH_2)_3-$, where y is 2,

b) aminosilane of the general formula II



where the groups Z are identical or different and Z is an alkoxy group having from 1 to 4 carbon atoms, x and v, independently, are 0 or 1, the groups R^2 are identical or different, and R^2 is a linear, cyclic, or branched alkyl group having from 1 to 20 carbon atoms,

c) bisaminosilane of the general formula (III)

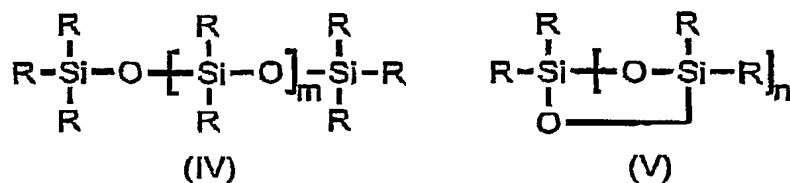


where the groups Z are identical or different and Z is an alkoxy group having from 1 to 4 carbon atoms, and w and z, independently of one another, are 0, 1 or 2,

d) aminosiloxane oligomers of the general formulae (IV) and (V),

O.Z. 6310-WO

13



where the substituents R are composed of

- aminopropyl-functional groups of the formula $-(\text{CH}_2)_3-\text{NH}_2$ or $-(\text{CH}_2)_3-\text{NHR}'$ or $-(\text{CH}_2)_3-\text{NH}(\text{CH}_2)_2-\text{NH}_2$ or $-(\text{CH}_2)_3-\text{NH}(\text{CH}_2)_2-\text{NH}(\text{CH}_2)_2-\text{NH}_2$, where R' is a linear, branched, or cyclic alkyl group having from 1 to 18 carbon atoms, or an aryl group having from 6 to 12 carbon atoms, and
- methoxy, ethoxy and/or propoxy groups, and
- where appropriate, alkyl, alkenyl, isoalkyl or cycloalkyl groups having from 1 to 18 carbon atoms, and/or aryl groups having from 6 to 12 carbon atoms,

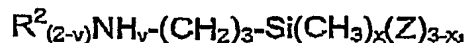
where at most one aminopropyl-functional group has bonding to a silicon atom and the degree of oligomerization for compounds of the general formula IV is in the range $2 \leq m \leq 30$, and that for compounds of the general formula V is $3 \leq n \leq 16$,

- e) a mixture composed of at least two of the amino-functional silicon compounds selected from the group of an aminosilane of the general formula



where the groups Z are identical or different and Z is an alkoxy group having from 1 to 4 carbon atoms, x is 0 or 1, and R¹ is an amino group of the formula $\text{H}_2\text{N}-[(\text{CH}_2)_2\text{NH}]_y-(\text{CH}_2)_3-$, where y is 0 or 1 or 2,

an aminosilane of the general formula



where the groups Z are identical or different and Z is an alkoxy group having from 1 to 4 carbon atoms, x and v, independently, are 0 or 1,

O.Z. 6310-WO

14

the groups R^2 are identical or different, and R^2 is a linear, cyclic, or branched alkyl group having from 1 to 20 carbon atoms or an aryl group having from 6 to 12 carbon atoms,

- 5 a bisaminosilane of the said general formula (III), and
the aminosiloxane oligomers of the said general formulae (IV) and (V),

or

- 10 f) a mixture of at least one amino-functional silicon compound with at least one vinyl silane and/or alkyl silane.

2. The highly filled compound as claimed in claim 1, the preparation of which is based on starting materials from the following series

- 15 (i) polypropylene (PP) or polyethylene (PE),
(ii) maleic-anhydride-modified polypropylene or maleic-anhydride-modified polyethylene,
(iii) filler,
(iv) at least one aminosilane and/or aminosiloxane according to a) – f), and
20 (v) where appropriate, stabilizers and processing aids.

3. The highly filled compound as claimed in claim 1 or 2,

wherein

- the proportion of component (ii) is from 0.1 to 10 parts by weight, based on the
25 entire polymer content.

4. The highly filled compound as claimed in any of claims 1 to 3,

wherein

- metal powders, metal oxides, metal hydroxides, and/or biomaterials are present
30 as fillers.

5. The highly filled compound as claimed in claim 4,

O.Z. 6310-WO

15

wherein

magnesium hydroxide, silicon dioxide, silicates, organoclays, aluminum hydroxide, antimony oxide, calcium carbonate, wood, natural fibers, or biodegradable fillers are present.

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6. The highly filled compound as claimed in any of claims 1 to 5, wherein the filler content is from 30 to 85% by weight, based on the compound.

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7. The highly filled compound as claimed in any of claims 1 to 6, wherein the content of component (iv) is from 0.01 to 5% by weight, based on the compound.

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8. A process for preparing a polyolefin compound as claimed in any of claims 1 to 7, which comprises

(A) combining components (i), (ii), (iii), (iv) and, where appropriate, (v) in a heated mixing assembly with extrusion apparatus, mixing these, extruding the melt, and obtaining pellets,

20

or

(B) first coating or mixing component (iii) with component (iv) in a stirred tank, and also combining components (i) and (ii) and also, where appropriate, (v), in a heated mixing assembly with extrusion apparatus, and mixing these, and then adding the mixture of components (iii) and (iv) produced in the reactor to, and incorporating it into, the polymer mixture, extruding the melt, and obtaining the pellets.

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9. A polyolefin compound obtainable as claimed in claim 8.

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10. The use of at least one amino-functional silicon compound as claimed in any of claims 1 to 9 for preparing highly filled polyolefin compounds.

O.Z. 6310-WO

16

11. The use of highly filled polyolefin compounds as claimed in any of claims 1 to 7 or of a compound obtained as claimed in claim 8 or 9 for producing polyolefin moldings.
- 5 12. The use of a polyolefin compound as claimed in any of claims 1 to 11 for producing flame-retardant compounds for cables.
13. An item whose production is based on a polyolefin compound as claimed in any of claims 1 to 12.